Gastroesophageal Reflux (GER) and Gastroesophageal Reflux Disease (GERD) in Infants

National Digestive Diseases Information Clearinghouse

National Institute of Diabetes and Digestive and Kidney Diseases

What is GER?

Gastroesophageal reflux (GER) occurs when stomach contents flow back up into the esophagus—the muscular tube that carries food and liquids from the mouth to the stomach.

GER is also called acid reflux or acid regurgitation because the stomach's digestive juices contain acid. Infants with GER spit up liquid mostly made of saliva and stomach acids. GER is common in infants under 2 years of age. About half of all infants spit up, or regurgitate, many times a day in the first 3 months of life. Most healthy infants experience few to no symptoms and stop spitting up between the ages of 12 and 14 months.[1]

What is GERD?

Gastroesophageal reflux disease (GERD) is a more serious, chronic—or long lasting—form of GER. According to studies, health care providers may often overlook GERD or mistake GERD for GER. If an infant's GER progresses to GERD, additional symptoms—such as vomiting and poor feeding—occur and can adversely affect the child's overall health and temperament. Infants with severe symptoms or with GER that lasts beyond 12 to 14 months may actually have GERD and should see a pediatrician—a doctor who specializes in treating children.

What causes GER and GERD in infants?

When the lower esophageal sphincter—the muscle that acts as a valve between the esophagus and stomach—has not fully developed in infants, GER can occur. While the sphincter muscle is still developing, it may push stomach contents back up, resulting in regurgitation. Once the sphincter muscle more fully develops, regurgitation should stop.

In contrast, GERD most often occurs when the sphincter muscle becomes weak or relaxes when it should not, causing stomach contents to rise up into the esophagus.

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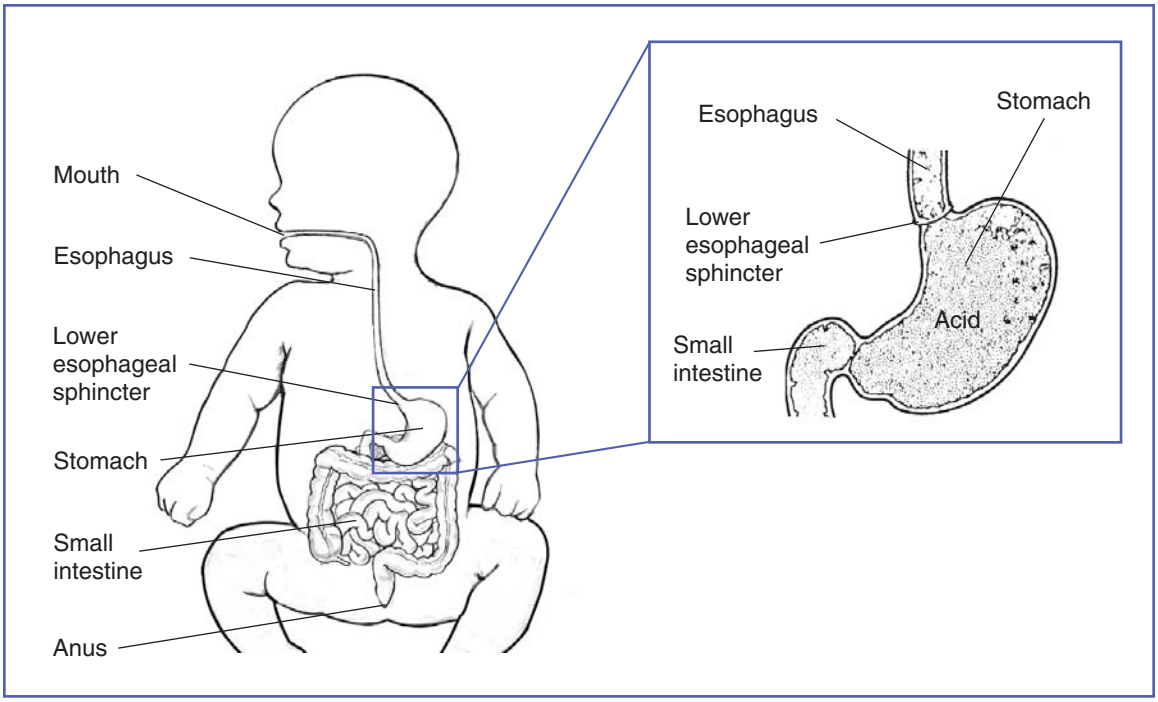
[1]Vandenplas Y, Rudolph CD, Di Lorenzo C, et al. Pediatric gastroesophageal reflux clinical practice guidelines: joint recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN). *Journal of Pediatric Gastroenterology and Nutrition.* 2009;49:498–547.



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What is the gastrointestinal (GI) tract?

The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The movement of muscles in the GI tract, along with the release of hormones and enzymes, starts the digestion of food. The upper GI tract includes the mouth, esophagus, stomach, small intestine, and duodenum, which is the first part of the small intestine.

What are the symptoms of GERD in infants?

Infants with GERD spit up and have some or all of the following recurrent symptoms:

- vomiting
- coughing
- gagging or trouble swallowing
- pneumonia or trouble breathing
- wheezing
- irritability, particularly after feedings

- arching of the back—often during or immediately after feedings
- poor feeding or refusal to feed
- poor weight gain or weight loss
- poor growth and malnutrition
- colic

Other disorders can cause these symptoms, so a health care provider needs to confirm a GERD diagnosis.

Caregivers should call their infant's pediatrician right away if their infant

- vomits large amounts or has persistent projectile, or forceful, vomiting, particularly in infants younger than 2 months
- vomits fluid that is green or yellow, looks like coffee grounds, or contains blood
- has difficulty breathing after vomiting or spitting up
- refuses feedings repeatedly, resulting in poor weight gain or weight loss
- cries excessively and is extremely irritable
- shows signs of dehydration, such as dry diapers or no tears when crying

How is GERD diagnosed in infants?

If an infant appears healthy, has good growth, and seems to have typical GER, the infant usually does not need tests or treatment. Even if a pediatrician suspects GERD, simple feeding changes can often reduce symptoms.

In some cases, a health care provider may order tests to help determine whether the infant's symptoms relate to GERD or another medical condition and require medication. A health care provider may refer an infant with suspected GERD to a pediatric gastroenterologist, a doctor who specializes in children's digestive diseases, for diagnosis and treatment.

A completely accurate test for diagnosing GERD does not exist. However, several tests can help with diagnosis. The following are some common tests performed on infants with suspected GERD:

Upper GI series. A pediatric gastroenterologist may use an upper GI series in infants to exclude the possibility of a congenital abnormality of the upper GI tract. Although a pediatric gastroenterologist does not use this test to diagnose acid reflux or GERD, an upper GI series serves as an important tool to look at the shape of the upper GI tract. An x-ray technician performs

the test at a hospital or an outpatient center, and a radiologist—a doctor who specializes in medical imaging—interprets the images. This test does not require anesthesia. If possible, caretakers should not feed their infant before the procedure, as directed by the health care staff. Caretakers should check with the infant's pediatric gastroenterologist about what to do to prepare for an upper GI series.

During the procedure, the infant will rest in front of an x-ray machine and will drink barium, a chalky liquid, from a bottle. Barium coats the esophagus, stomach, and small intestine, so the radiologist and pediatric gastroenterologist can clearly see these organs' shapes on the x-ray images.

For several days afterward, barium liquid in the GI tract causes white or light-colored stools. A health care provider will provide specific instructions about eating and drinking after the test.

Upper endoscopy. A pediatric gastroenterologist will use an upper endoscopy, also known as an esophagogastroduodenoscopy, if an infant continues to have GERD symptoms despite feeding changes and treatment with medications. The procedure is necessary, particularly if an infant has respiratory or growth problems associated with GERD. This procedure involves using an endoscope—a small, flexible tube with a light—to see the upper GI tract.

A pediatric gastroenterologist performs this test at a hospital or an outpatient center. A health care provider places an intravenous (IV) needle in the infant's vein to give sedating medications, and the infant receives extra oxygen throughout the procedure.

After the infant receives sedation, the pediatric gastroenterologist carefully feeds an endoscope through the mouth and down the esophagus, then into the stomach and duodenum. A small camera mounted on the endoscope transmits a video image to a monitor, allowing close examination of the intestinal lining. The pediatric gastroenterologist uses the endoscope to take a biopsy, a procedure that involves taking a small piece of esophageal tissue. A pathologist—a doctor who specializes in diagnosing diseases—will examine the tissue with a microscope and determine the extent of inflammation.

Esophageal pH monitoring. Esophageal pH monitoring measures the amount of liquid or acid in the esophagus and is the most accurate test for acid reflux. A pediatric gastroenterologist performs this test at a hospital as part of an upper endoscopy. Most infants stay in the hospital for the duration of this test.

A pediatric gastroenterologist passes a thin tube, called a nasogastric probe, through the infant's nose or mouth to the stomach while the infant is awake. The pediatric gastroenterologist will then pull the tube back into the esophagus, where it will be taped to the cheek and remain for 24 hours. The end of the tube in the esophagus has a small probe to measure when and how much liquid or acid comes up into the esophagus. The other end of the tube, attached to a monitor outside the body, shows the measurements taken. The procedure can also help show whether reflux triggers respiratory symptoms.

How is GERD treated in infants?

Treatment for GERD depends on the infant's symptoms and age and may involve one or more of the following: feeding changes, medications, or surgery.

Feeding Changes

The heath care provider may recommend some feeding changes as a first line of treatment. Caregivers can

- add up to 1 tablespoon of rice cereal for every 2 ounces of formula in bottles; if the mixture is too thick, the nipple size can be changed or a little "x" can be cut in the nipple
- add rice cereal to expressed milk for breastfed babies
- burp infants after they consume 1 to 2 ounces of formula, or burp breastfed infants after feeding on each side
- avoid overfeeding infants by following the amount of formula or breast milk recommended by a pediatrician
- hold infants upright for 30 minutes after feedings
- put infants on a 2- to 4-week trial of hydrolyzed protein formula—the protein content of this type of formula has been broken down or "predigested"—if a pediatrician suspects a sensitivity to milk protein

Medications

If the infant still has recurrent GERD symptoms after making feeding changes, has difficulty sleeping or eating, or does not grow properly, a health care provider may recommend medication to decrease the amount of acid in the stomach. A health care provider often prescribes medication on a trial basis and will explain any potential complications related to the medication. Caregivers should not give their infant any medications unless told to do so by a health care provider.

If the infant requires medication, treatment will often start with a class of medications called **H2 blockers,** including cimetidine (Tagamet), famotidine (Pepcid), nizatidine (Axid), and ranitidine (Zantac). H2 blockers decrease acid production and come in over-the-counter and prescription strengths. These medications provide short-term or on-demand relief and work effectively in many infants with GERD symptoms. H2 blockers can help to heal the esophagus. If these medications don't work, the health care provider may prescribe proton pump inhibitors (PPIs).

PPIs include omeprazole (Prilosec, Zegerid), lansoprazole (Prevacid), pantoprazole (Protonix), rabeprazole (Aciphex), and esomeprazole (Nexium), which are available by prescription. Omeprazole and lansoprazole are also available in

over-the-counter strength. PPIs are more effective than H2 blockers and can relieve symptoms and heal the esophageal lining in infants with GERD who have not responded to H2 blockers. PPIs are the most common medication used for long-term management of GERD. However, studies show they are more likely to cause wrist, hip, and spinal fractures when taken long term or in high doses. Infants should take these medications on an empty stomach in order for stomach acid to activate them.

Surgery

Only rarely and in severe cases, such as severe respiratory problems or a physical abnormality that causes symptoms, will a pediatric gastroenterologist use surgery to treat GERD in infants.

Eating, Diet, and Nutrition

If an infant is not growing properly or is malnourished despite feeding changes, a pediatrician may recommend higher-calorie formula or tube feedings.

Points to Remember

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- Most healthy infants experience few to no symptoms and stop spitting up between the ages of 12 and 14 months.
- Gastroesophageal reflux disease (GERD) is a more serious, chronic form of GER.
- If an infant appears healthy, has good growth, and seems to have typical GER, the infant usually does not need tests or treatment.
- Even if a pediatrician suspects GERD, simple feeding changes can often reduce symptoms. In some cases, a health care provider may order tests to help determine whether the infant's symptoms relate to GERD or another medical condition and require medication.
- Treatment for GERD depends on the infant's symptoms and age and may involve one or more of the following: feeding changes, medications, or surgery.

Hope through Research

The Division of Digestive Diseases and Nutrition at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) supports basic and clinical research into GI diseases, including GER and GERD.

Clinical trials are research studies involving people. Clinical trials look at safe and effective new ways to prevent, detect, or treat disease. Researchers also use clinical trials to look at other aspects of care, such as improving the quality of life for people with chronic illnesses. To learn more about clinical trials, why they matter, and how to participate, visit the NIH Clinical Research Trials and You website at *www.nih.gov/health/clinicaltrials.* For information about current studies, visit *www.ClinicalTrials.gov.*

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NASPGHAN
North American Society for Pediatric Gastroenterology, Hepatology and Nutrition

NASPGHAN FOUNDATION
For Children's Digestive Health & Nutrition

APGNN
The Association of Pediatric Gastroenterology and Nutrition Nurses

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This publication is available at *www.digestive.niddk.nih.gov.*

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